GENERAL

See Figure 6-31. The transmission is a five-speed constant-mesh type housed in an extension of the crankcase. The transmission permits the rider to vary the ratio of engine speed-to-rear driving wheel speed in order to meet the varying conditions of operation.

LUBRICATION

Drain transmission and refill to correct level with fresh, clean lubricant at least once each year or every 5000 miles (8000 km), whichever comes first. For best results, drain lubricant while hot. See 6.4 CLUTCH.

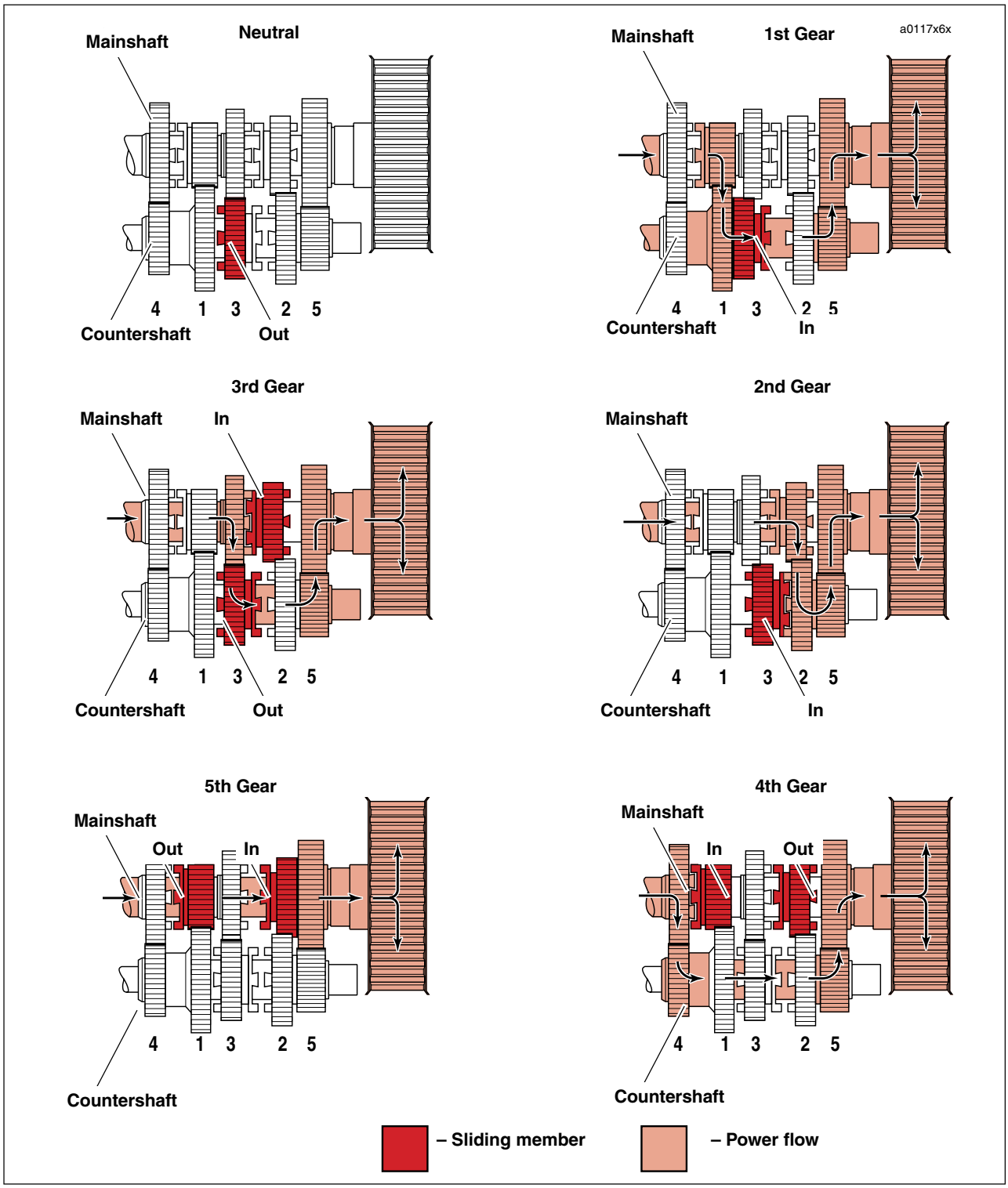


Figure 6-31. Transmission Power Flow

TRANSMISSION CASE 6.8

GENERAL

The rear compartment of the left and right crankcase halves form the transmission case. Servicing of transmission components requires removing the engine and disassembling (splitting) the crankcase.

REMOVAL

1. Remove transmission sprocket. See 6.16 TRANSMISSION SPROCKET.
2. Remove engine from chassis.See 3.3 STRIPPING MOTORCYCLE FOR ENGINE REPAIR/REMOVAL.
3. Support engine using ENGINE SUPPORT STAND (Part No. HD-42310/HD-43646 or HD-43682).
4. Disassemble top end. See 3.5 CYLINDER HEAD.
5. Disassemble gearcase. See 3.16 GEARCASE COVER AND CAM GEARS.
6. Remove primary cover. See 6.2 PRIMARY CHAIN.
7. Remove clutch assembly, primary chain and engine sprocket. See 6.6 PRIMARY DRIVE/CLUTCH.
8. See Figure 6-32. Place transmission in gear. Remove countershaft TORX screw (1) and retention collar (2).
9. See Figure 6-33. Detach spring (11) from groove in post .
10. Remove retaining ring (10) and detent plate (9). Discard retaining ring (10). You will need to use a **new** retaining ring for installation.
11. Remove starter. See 5.7 STARTER.
12. Remove two locknuts (2) and washers (3) which attach shifter shaft assembly (1) to studs at transmission case. Remove shifter shaft assembly (1).
13. Remove detent screw (8),detent arm (7) and spring (11).
14. See Figure 3-35. Remove all transmission case bolts.
15. See Figure 3-35. Remove rear motor mount (9) and mounting hardware (10,11).
16. See Figure 6-34. Separate crankcase halves.

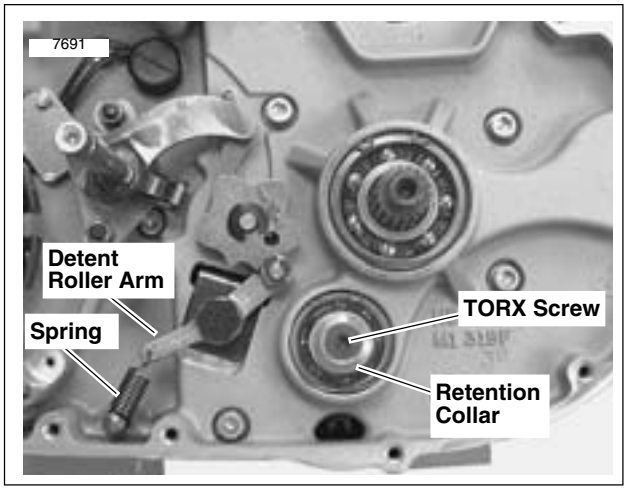
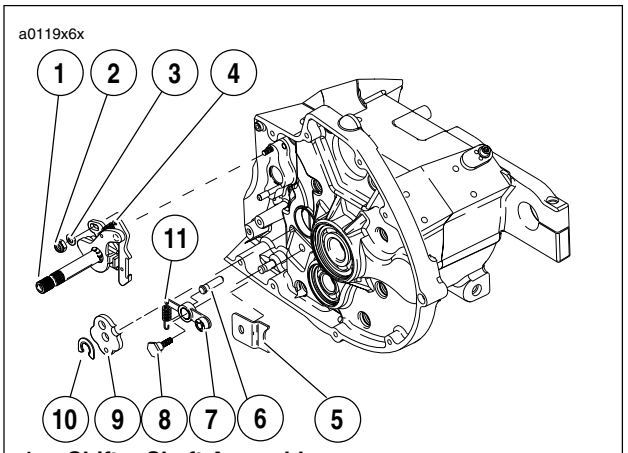


Figure 6-32. Countershaft Retainer



1. **Shifter Shaft Assembly**
2. **Locknut (2)**
3. **Washer (2)**
4. **Shifter Pawl**
5. **Plate**
6. **Pin**
7. **Detent Arm**
8. **Detent Screw**
9. **Detent Plate**
10. **Retaining Ring**
11. **Spring**

Figure 6-33. Shifter Shaft Assembly

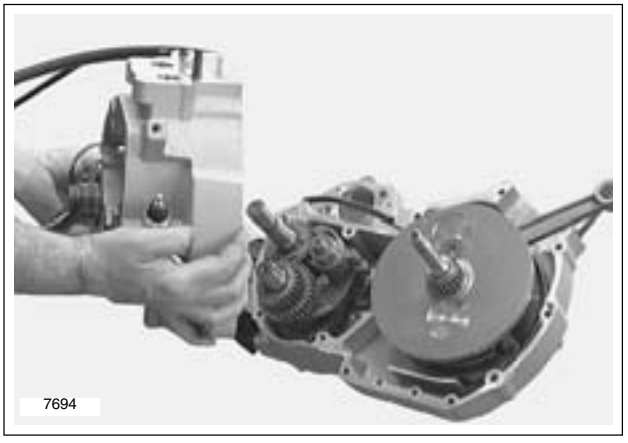
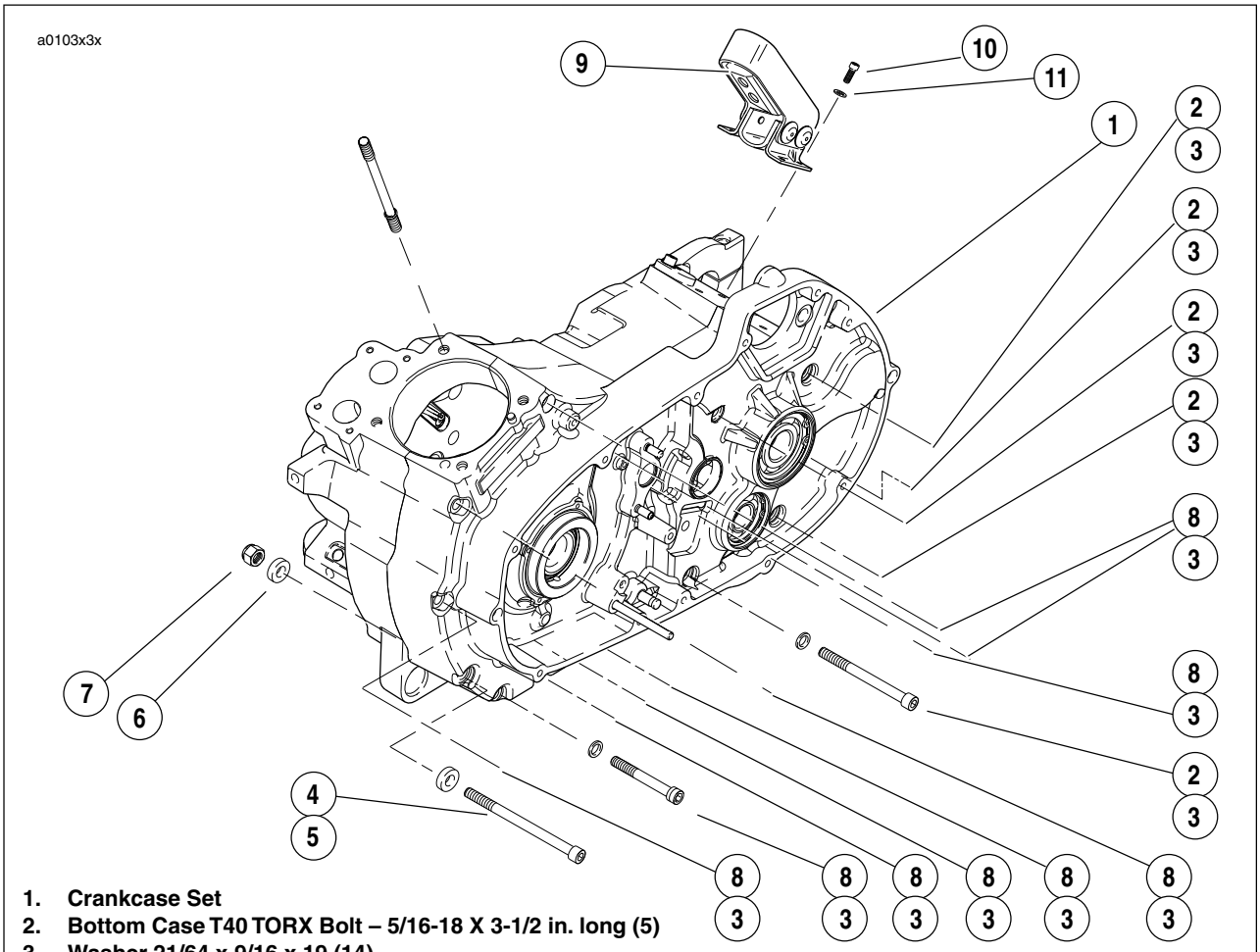


Figure 6-34. Splitting Crankcase Halves



1. Crankcase Set
2. Bottom Case T40 TORX Bolt – 5/16-18 X 3-1/2 in. long (5)
3. Washer 21/64 x 9/16 x 19 (14)
4. Hex Socket Head Screw – 3/8-16 X 4-1/2 in. long (1)
5. Spacer (1)
6. Washer - 3/8 I.D. X 13/16 O.D. (1)
7. Nyloc, Hex Locknut - 3/8-16
8. Hex Socket Head Screw – 5/16-18 X 2-1/2 in. long (9)
9. Rear Isolator
10. Screw (4)
11. Washer (4)

Figure 3-35. Crankcase Hardware

CASE REMOVAL

NOTES

- *If transmission only is being serviced, do not remove flywheel assembly.*
- *For crankcase, flywheel or other major servicing, the flywheel assembly can be removed at any time. The same specialty tools are used.*

1. See Figure 6-36. Remove transmission case. See 6.8 TRANSMISSION CASE
2. See Figure 6-36. Split crankcases in half. See 6.8 TRANSMISSION CASE.
3. Remove crankcase and transmission assembly from engine stand.
4. See Figure 6-37. Place crankcase (3) and transmission assembly (4) into fixture on arbor press (1).
   a. Support transmission assembly on parallel supports (5).
5. Press transmission assembly using TRANSMISSION REMOVER (2) (Part No. B-43895-1) to remove transmission assembly from crankcase half.
6. Remove crankcase from fixture.

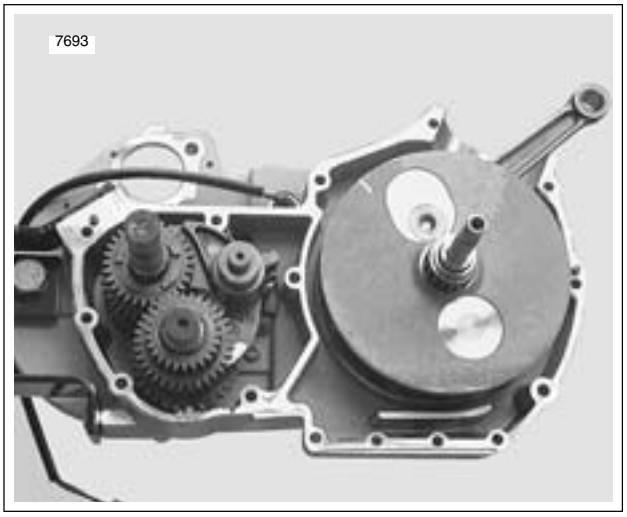
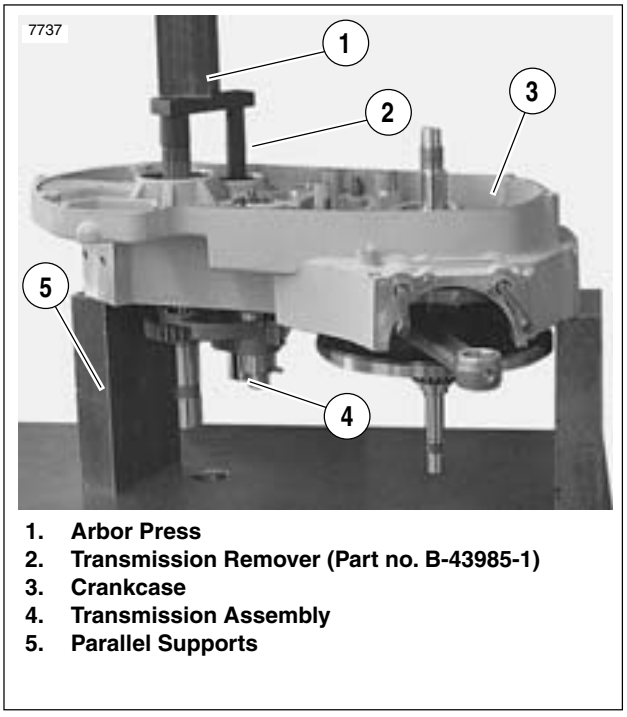


Figure 6-36. Transmission Assembly

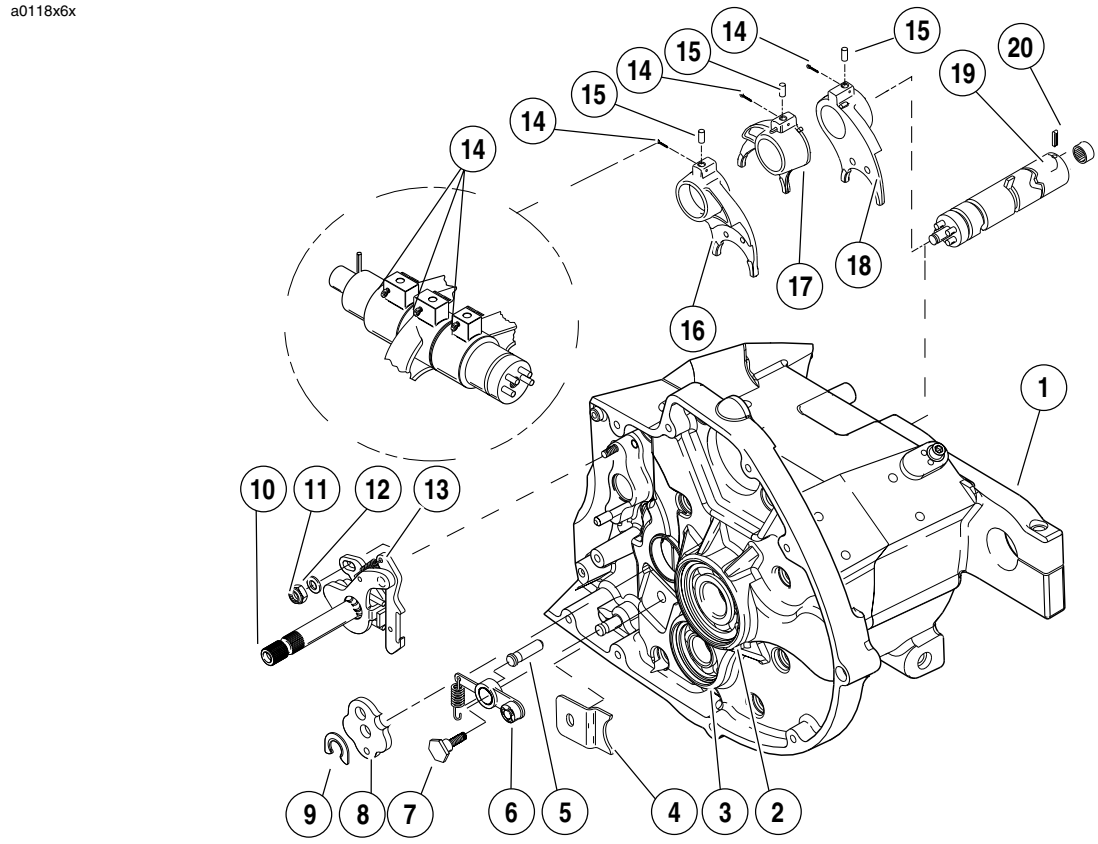


1. **Arbor Press**
2. **Transmission Remover (Part no. B-43985-1)**
3. **Crankcase**
4. **Transmission Assembly**
5. **Parallel Supports**

Figure 6-37. Transmission Remover/Installer on Fixture

SHIFTER FORKS AND DRUM DISASSEMBLY

1. See Figure 6-38. Remove and discard the three fork cotter pins (14).
2. Remove three shifter fork pins (15). A small magnet is useful in freeing the fork pins.
3. Slide shifter fork drum (19) away through shifter forks. The neutral indicator pin (20) prevents removal in the other direction.
4. Remove shifter forks (16, 17, 18).



1. **Right Crankcase Half**
2. **Mainshaft Bearing**
3. **Countershaft Bearing**
4. **Plate**
5. **Pin**
6. **Detent Arm**
7. **Detent Screw**
8. **Detent Plate**
9. **Retaining Ring**
10. **Shifter Shaft Assembly**
11. **Locknut (2)**
12. **Washer (2)**
13. **Shifter Pawl**
14. **Cotter Pin (3)**
15. **Shifter Fork Pin (3)**
16. **Shifter Fork 4th Gear**
17. **Shifter Fork 1st & 2nd Gear**
18. **Shifter Fork 3rd & 5th Gear**
19. **Shifter Fork Drum**
20. **Neutral Indicator Pin**

Figure 6-38. Shifter Mechanism

DISASSEMBLY

NOTE

As the transmission runs, each part develops a certain wear pattern and a kind of "set" with its mating parts. For this reason, it is important that each component be reinstalled in its original location and facing its original direction.

1. See Figure 6-39. As each component is removed, place it on a clean surface in the exact order of removal.

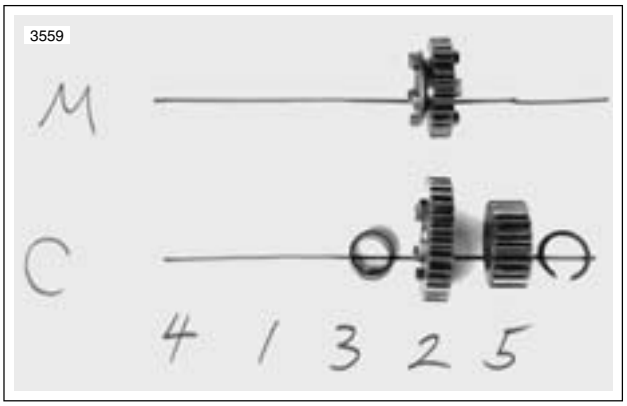
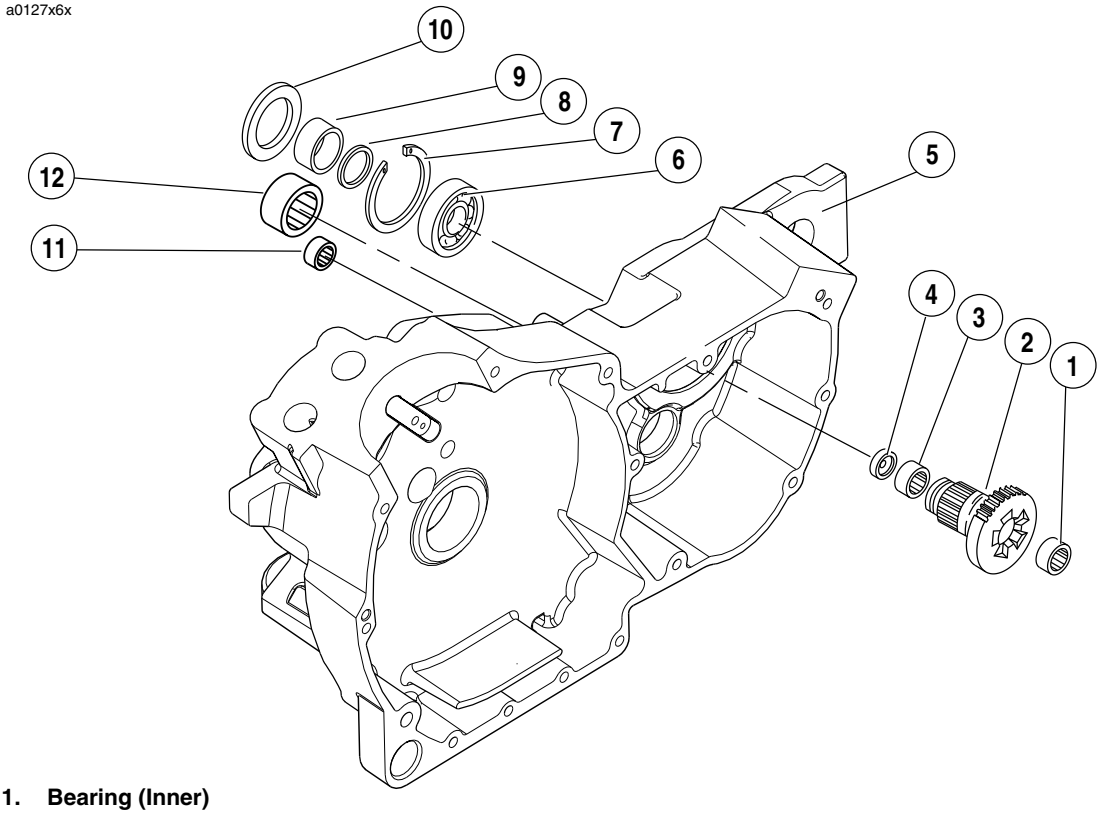
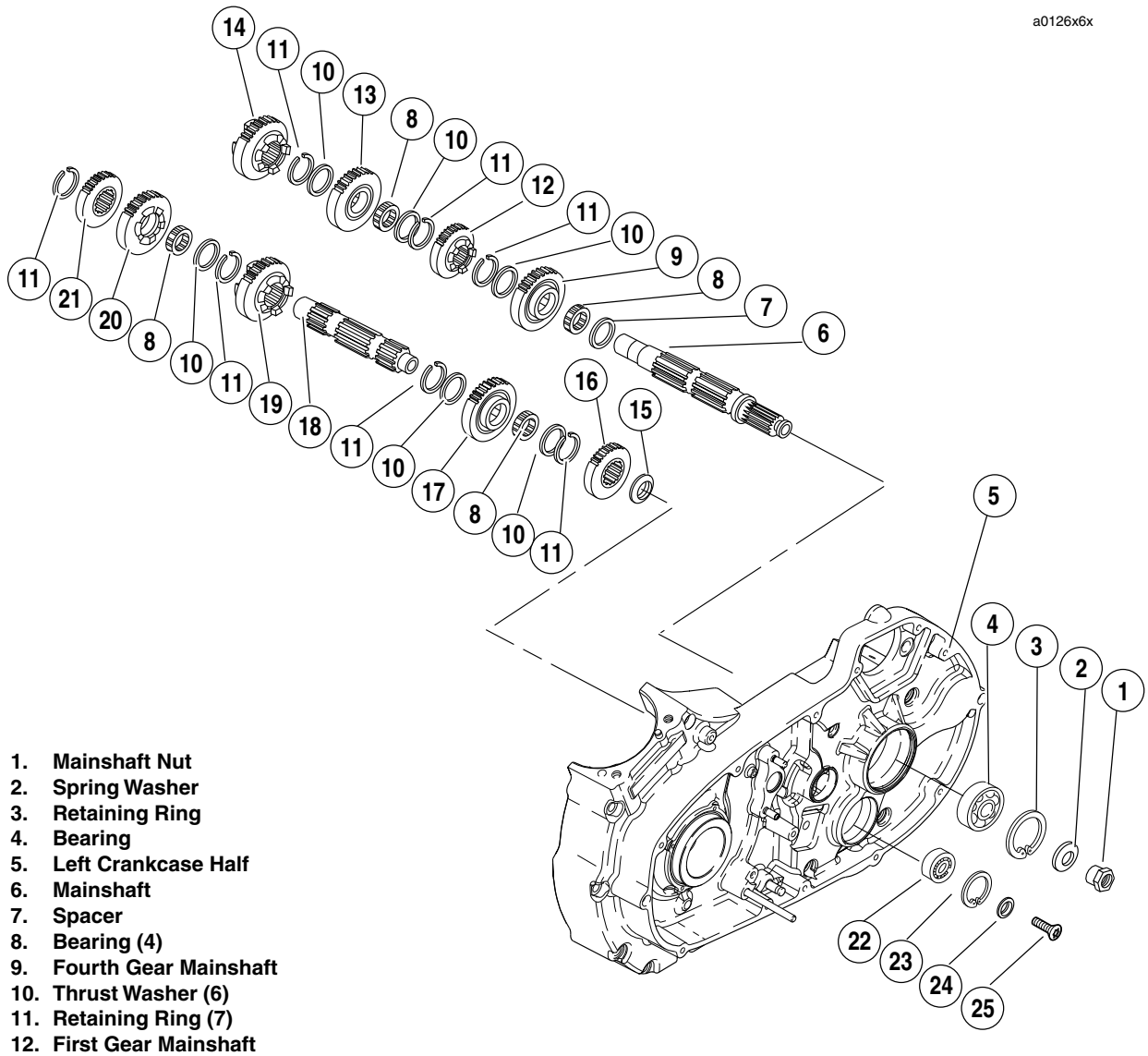


Figure 6-39.



1. **Bearing (Inner)**
2. **Fifth Gear Mainshaft**
3. **Bearing (Outer)**
4. **Oil Seal**
5. **Right Crankcase Half**
6. **Ball Bearing**
7. **Retaining Ring**
8. **Quad Seal**
9. **Spacer**
10. **Oil Seal**
11. **Bearing (closed end) Shifter Drum**
12. **Bearing (closed end) Countershaft**

Figure 6-40. Transmission Assembly Right Crankcase Half



1. Mainshaft Nut
2. Spring Washer
3. Retaining Ring
4. Bearing
5. Left Crankcase Half
6. Mainshaft
7. Spacer
8. Bearing (4)
9. Fourth Gear Mainshaft
10. Thrust Washer (6)
11. Retaining Ring (7)
12. First Gear Mainshaft
13. Third Gear Mainshaft
14. Second Gear Mainshaft
15. Spacer
16. Fourth Gear Countershaft
17. First Gear Countershaft
18. Countershaft
19. Third Gear Countershaft
20. Second Gear Countershaft
21. Fifth Gear Countershaft
22. Bearing
23. Retaining Ring
24. Countershaft Retainer
25. Screw

Figure 6-41. Transmission Assembly Left Crankcase Half

MAINSHAFT DISASSEMBLY

1. Remove mainshaft 2nd (14) gear from mainshaft (6).
2. At mainshaft, between mainshaft 1st gear (12) and mainshaft 3rd gear (13), expand retaining ring (11) and move next to mainshaft 1st gear (12) along with thrust washer (10). Move mainshaft 3rd gear (13) as far as possible toward mainshaft 1st gear (12). Expand retaining ring (11) at opposite side of mainshaft 3rd gear (13) and slide off end of shaft. Slide thrust washer (10) off end of mainshaft
3. Remove mainshaft 3rd gear (13) and its split bearing (8)
4. Slide thrust washer (10) off end of mainshaft. Expand retaining ring (11), which is next to mainshaft 1st gear (12), and slide off end of shaft.
5. Remove mainshaft 1st gear (12) off mainshaft.
6. Expand retaining ring (11) and slide off end of shaft. Slide thrust washer (10) off end of mainshaft
7. Remove mainshaft 4th gear (9).
8. Remove split bearing (8) and spacer (7).

COUNTERSHAFT DISASSEMBLY

1. See Figure 6-41. Using RETAINING RING PLIERS (Part No. J-5586) remove and discard retaining ring (11) next to countershaft 5th gear (21). Slide countershaft 5th (21), and countershaft 2nd (20) off end of countershaft (18).
2. Remove split bearing (8) that was under countershaft 2nd gear (20) and thrust washer (10), including retaining ring (11) on the countershaft (6). Slide countershaft 3rd (19) gear off free end of shaft (18).
3. Remove beveled washer (spacer) (15) and countershaft 4th gear (16).
4. Expand retaining ring (11) located next to countershaft 1st gear (17). Remove retaining ring (11) and thrust washer (10). Slide countershaft 1st gear (17) off end of shaft. Remove split bearing (8).
5. Remove thrust washer (10). Expand remaining retaining ring (11) and slide off countershaft (18).

CLEANING AND INSPECTION

⚠WARNING

Never use compressed air to “spin-dry” bearings. Spinning bearings with compressed air can also cause a bearing to fly apart, which could result in death or serious injury.

1. Clean all parts (except bearings) in cleaning solvent and blow dry with compressed air.
2. Check gear teeth for damage. If gears are pitted, scored, rounded, cracked or chipped, they should be replaced.
3. Inspect the engaging dogs on the gears. Replace the gears if dogs are rounded, cracked, battered, chipped or dimpled.
4. Discard all retaining rings that were removed.

MAINSHAFT SUB-ASSEMBLY

CAUTION

During assembly, the split bearings (8) and the internal bores of the gears must be lubricated with SPORTTRANS FLUID prior to assembly. Leaving these parts dry could accelerate wear at start-up.

1. See Figure 6-42. Install new retaining ring (11) and thrust washer (10) onto mainshaft (6) in the first ring groove from the end.
2. Install split bearing (8) onto mainshaft.
3. Locate mainshaft 4th gear (9), which can be identified by the two radial grooves at one side. Slide gear (9) onto shaft. Position gear over bearing (8) next to spacer (7).
4. Place spacer (7) over mainshaft and position next to split bearing (8).
5. Slide mainshaft 1st gear (12) onto mainshaft with the fork groove facing 4th gear (9).
6. Install thrust washer (10) and new retaining ring (11) next to mainshaft 1st gear (12).

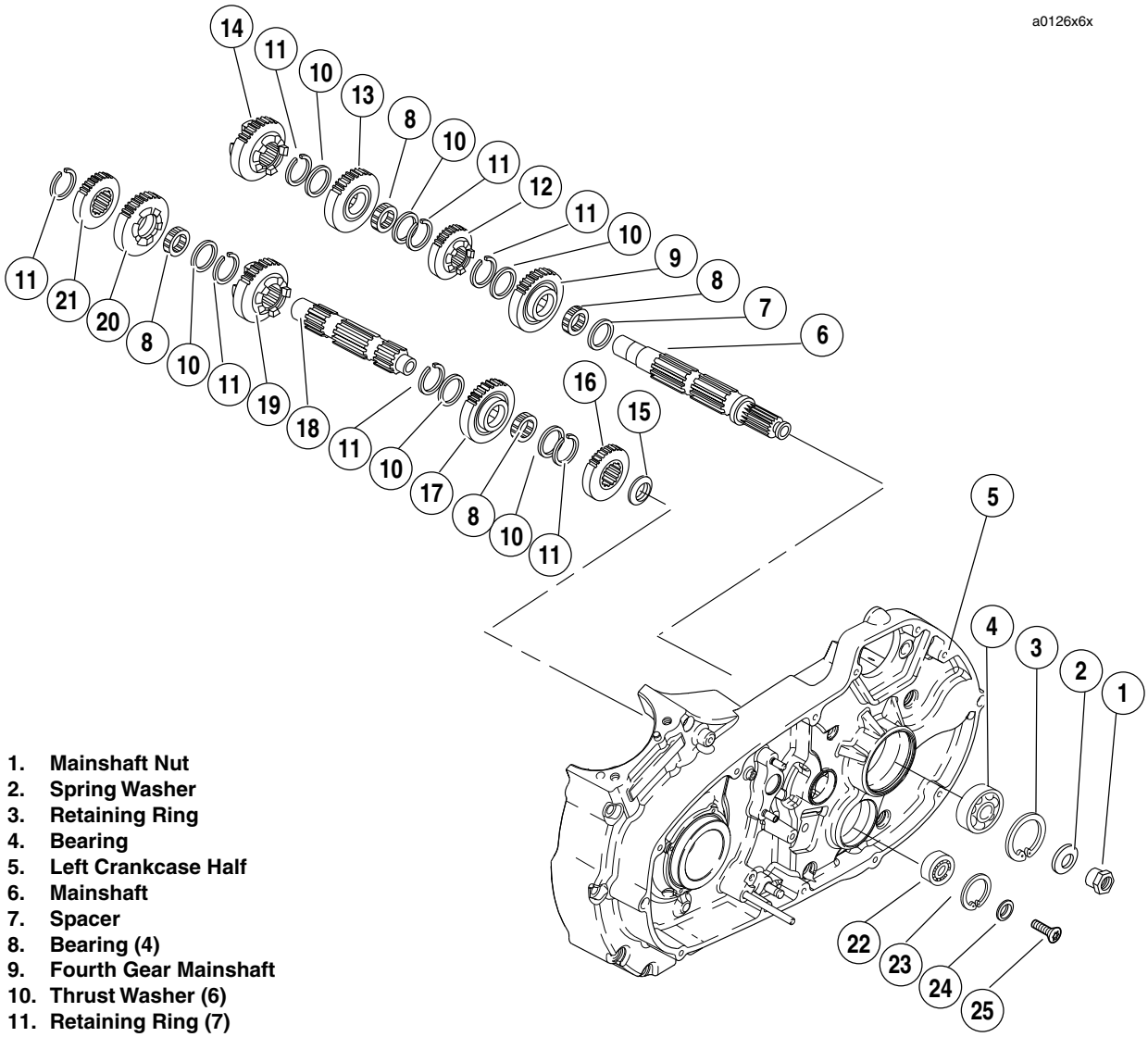
NOTE

It will be necessary to push the retaining ring into final position (ring groove) with a screwdriver.

7. Install split bearing (8) onto mainshaft.
8. Install mainshaft 3rd gear (13) onto shaft over bearing (8).
9. Install thrust washer (10) and new retaining ring (11).
10. Install mainshaft 2nd gear (14) onto shaft with the fork groove facing 3rd gear(13).

COUNTERSHAFT SUB-ASSEMBLY

1. See Figure 6-42.Install new retaining ring (11) and thrust washer (10) onto countershaft (18) in the second ring groove from the end.
2. Install split bearing (8) onto countershaft.
3. Locate countershaft 1st gear (17), which can be identified by the two radial grooves at one side. Slide gear (17) onto shaft. Position gear over bearing (8).
4. Install thrust washer (10) and new retaining ring (11) next to gear (17).
5. Locate countershaft 4th gear (16). This flat, shoulderless gear is splined and has a single radial groove at one side. Position gear next to retaining ring (11) on countershaft. Place beveled washer (spacer) (15) over end of shaft with beveled side away from countershaft 4th gear (16).
6. Install countershaft 3rd gear (19) on countershaft with fork groove facing away from countershaft 1st gear (17).
7. Install new retaining ring (11) on countershaft. Position new retaining ring in the second ring groove from the end. Install thrust washer (10) next to retaining ring (11). Install split bearing (8) in seat next to washer (10).
5. Install countershaft 2nd gear (20) with the locking dogs facing countershaft 3rd gear (19).
6. Install countershaft 5th gear (21) on countershaft.
7. Install new retaining ring(11) on countershaft.
8. Install shifter forks and drum. See 6.10 TRANSMISSION ASSEMBLY.



1. Mainshaft Nut
2. Spring Washer
3. Retaining Ring
4. Bearing
5. Left Crankcase Half
6. Mainshaft
7. Spacer
8. Bearing (4)
9. Fourth Gear Mainshaft
10. Thrust Washer (6)
11. Retaining Ring (7)
12. First Gear Mainshaft
13. Third Gear Mainshaft
14. Second Gear Mainshaft
15. Spacer
16. Fourth Gear Countershaft
17. First Gear Countershaft
18. Countershaft
19. Third Gear Countershaft
20. Second Gear Countershaft
21. Fifth Gear Countershaft
22. Bearing
23. Retaining Ring
24. Countershaft Retainer
25. Screw

Figure 6-42. Transmission Assembly Left Crankcase Half

SHIFTER FORKS AND DRUM ASSEMBLY

1. See Figure 6-38. for shifter fork identification. See Figure 6-43. Lubricate the shaft bore in fork with Sport Transmission Lube. Place 3rd and 5th gear shifter fork on shifter fork drum.
2. Lubricate the shaft bore in fork with Sport Transmission Lube. Place 1st and 2nd gear shifter fork on shifter fork drum.
3. Lubricate the shaft bore in fork with Sport Transmission Lube. Place 4th gear shifter fork on shifter fork drum.
4. See Figure 6-38. Position the shifter drum shaft so that the neutral indicator switch activator pin is upward. The shaft is then in the neutral position.

CAUTION

To prevent possible cotter pin damage, the pins must be inserted through the shifter forks as shown in the inset of Figure 6-44.

5. Align the hole through the top of each shifter fork with the appropriate cam groove in the shifter drum. Lubricate pins with Sport Transmission Lube. Drop pins through the holes in shifter forks. With a small screwdriver press on the pins while manipulating the forks back and forth until the pin seats in the drum groove. Secure pins in place with **new** cotter pins.
6. Align shifter fork assembly with transmission gear fork grooves.

This completes transmission assembly. Transmission components are now prepared for installation into the left crankcase half.

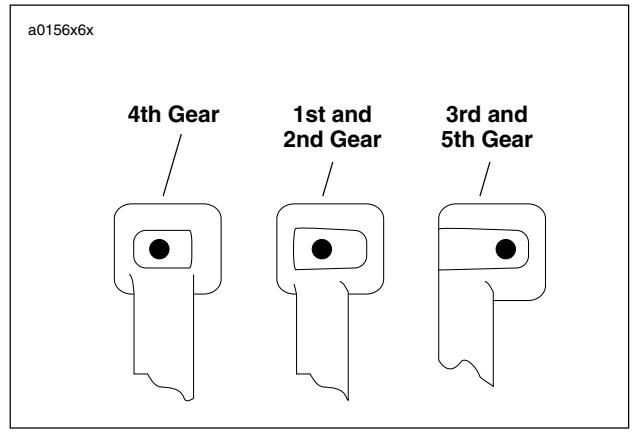
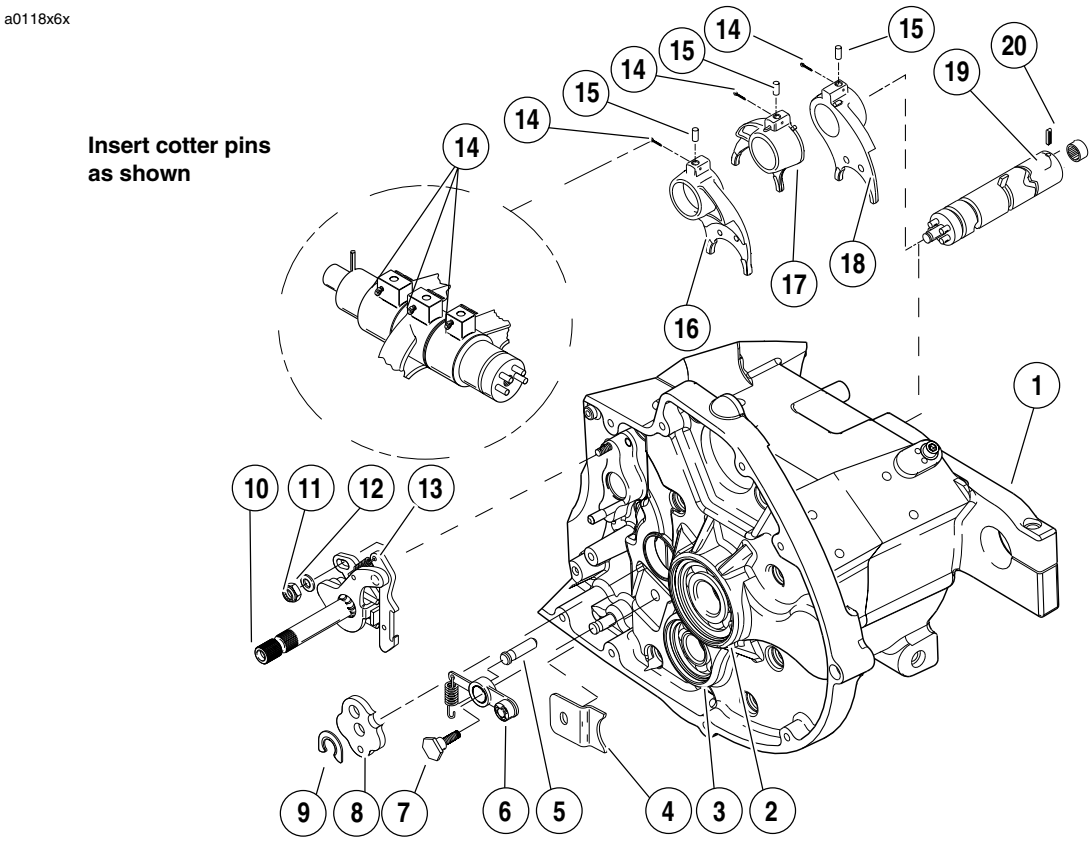


Figure 6-43. Shifter Fork Identification



1. Right Crankcase Half
2. Mainshaft Bearing
3. Countershaft Bearing
4. Plate
5. Pin
6. Detent Arm
7. Detent Screw
8. Detent Plate
9. Retaining Ring
10. Shifter Shaft Assembly
11. Locknut (2)
12. Washer (2)
13. Shifter Pawl
14. Cotter Pin (3)
15. Shifter Fork Pin (3)
16. Shifter Fork 4th Gear
17. Shifter Fork 1st & 2nd Gear
18. Shifter Fork 3rd & 5th Gear
19. Shifter Fork Drum
20. Neutral Indicator Pin

Figure 6-44. Shifter Mechanism

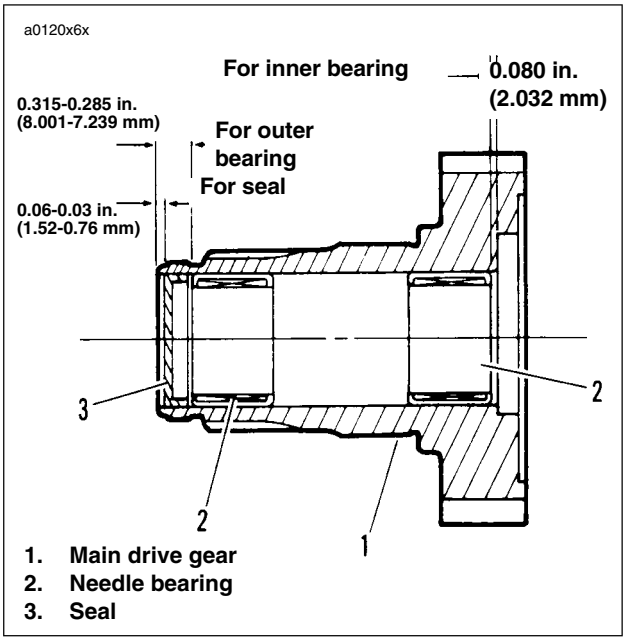
REMOVAL

1. Split crankcases in half. See 6.8 TRANSMISSION CASE.
2. Remove transmission as an assembly. See 6.8 TRANSMISSION CASE.
3. See Figure 6-45. From inside case tap out seal at end of mainshaft 5th gear. Discard seal.
4. Locate MAIN DRIVE GEAR REMOVER AND INSTALLER (Part No.HD-35316A) with CROSS PLATE (Part No. B-43983). Take crossplate and insert pins, at one side, into holes.
5. See Figure 6-46. Place crossplate on crankcase as shown.
6. See Figure 6-47. Insert bolt (2) through crossplate (1) and 5th gear (3).

CAUTION

When removing the main drive gear, the gear is pressed out against the resistance of the bearing inner race. Without any support at the inner race, the bearing is destroyed. Whenever the main drive gear is removed the main drive gear bearing will also have to be replaced.

9. At outside of case, place driver (4) and thrust washer (5) over end of bolt (2). Install and tighten nut (6) until 5th gear (3) is free.



1. Main drive gear
2. Needle bearing
3. Seal

Figure 6-45. Main Drive Gear Assembly

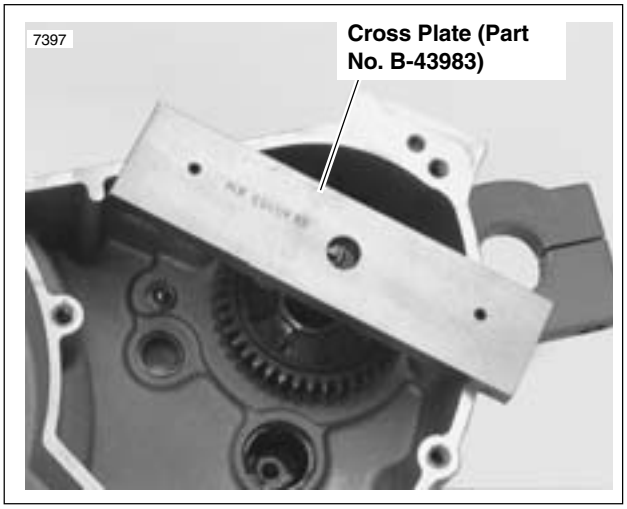
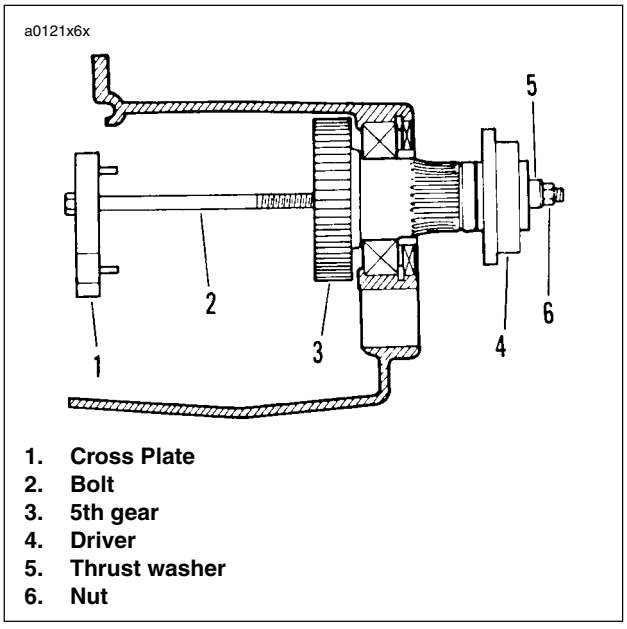


Figure 6-46. Cross Plate Mounting



1. Cross Plate
2. Bolt
3. 5th gear
4. Driver
5. Thrust washer
6. Nut

Figure 6-47. Removing Main Drive Gear

DISASSEMBLY

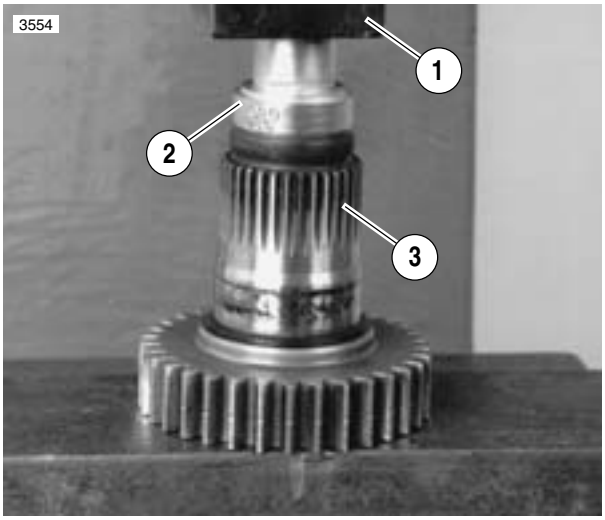
Drive out needle bearings from inside bore of main drive gear. Do not reuse bearings after removal.

ASSEMBLY

1. See Figure 6-48. Use INNER/OUTER MAIN DRIVE GEAR NEEDLE BEARING INSTALLATION TOOL (Part No. HD-37842-A) for assembly. Select which end of tool to use.
   a. The end stamped 0.080 in. (2.032 mm) is for driving the bearing into the inner end.
   b. The end stamped 0.315 in. (8.001 mm) is for the outer end bearing.
2. Assemble parts. The installation tool will automatically bottom on the gear when the correct depth is reached.
   a. Place main drive gear on a press.
   b. Press in the outer bearing to a depth of 0.315-0.285 in. (8.001-7.239 mm).
   c. Press in the inner bearing to a depth of 0.080 in. (2.032 mm).

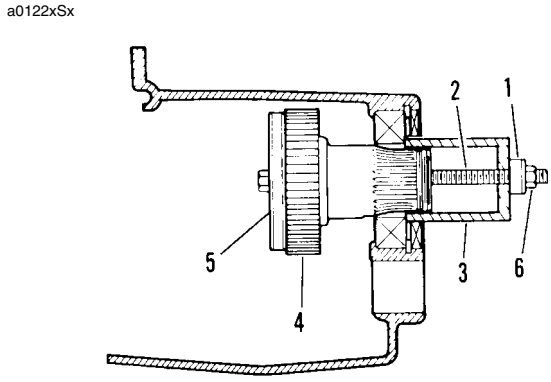
INSTALLATION

1. Replace main drive gear bearing.
2. See Figure 6-49. Use MAIN DRIVE GEAR REMOVER AND INSTALLER (Part No. HD-35316-A) for assembly.
   a. Take bolt (2) and place washer (5) followed by main drive gear (4) over end of bolt.
   b. From inside of case insert bolt and main drive gear through inner race of ball bearing.
   c. Insert threaded end of bolt (2) through installer cup (3) and thrust washer (1).
   d. Thread nut (6) onto end of bolt (2). Tighten nut (6) until shoulder on gear (4) bottoms against inner race of bearing.
3. See Figure 6-45. Tap in **new** seal (3) at threaded end of 5th gear.



1. **Ram on End of Press**
2. **Needle Bearing Installation Tool**
3. **Main Drive Gear**

Figure 6-48. Needle Bearing Installation Tool



1. **Thrust Washer**
2. **Bolt**
3. **Installer Cup**
4. **5th Gear**
5. **Washer**
6. **Nut**

Figure 6-49. Main Drive Gear Installation

RIGHT TRANSMISSION CASE BEARINGS 6.12

NOTE

See Figure 6-52. Refer to Transmission assembly right crankcase half, for location of items discussed on this page.

REMOVAL

1. Remove transmission assembly. See 6.9 TRANSMISSION DISASSEMBLY.
2. See Figure 6-50. Remove main drive 5th gear. Use MAIN DRIVE GEAR REMOVER AND INSTALLER (Part No.HD-35316A). See 6.11 MAIN DRIVE GEAR.
3. At outside of case remove seal next to 5th gear bearing retainer. Remove retaining ring.
4. From inside transmission case drive bearings (5th gear, countershaft or shifter shaft) out of bores. Carefully tap bearings free by working around bearing diameter to keep bearing from skewing.

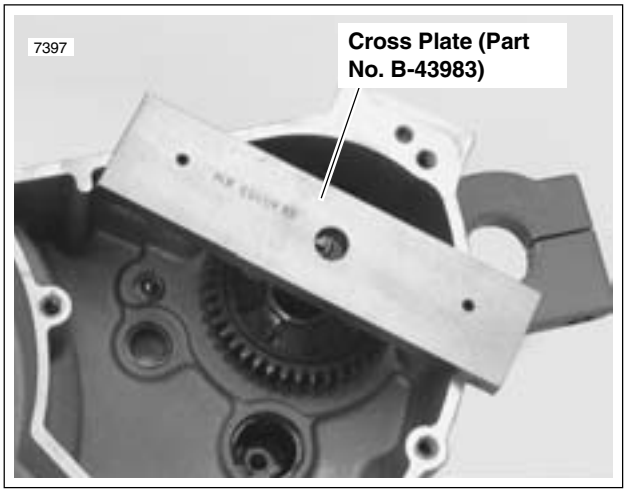
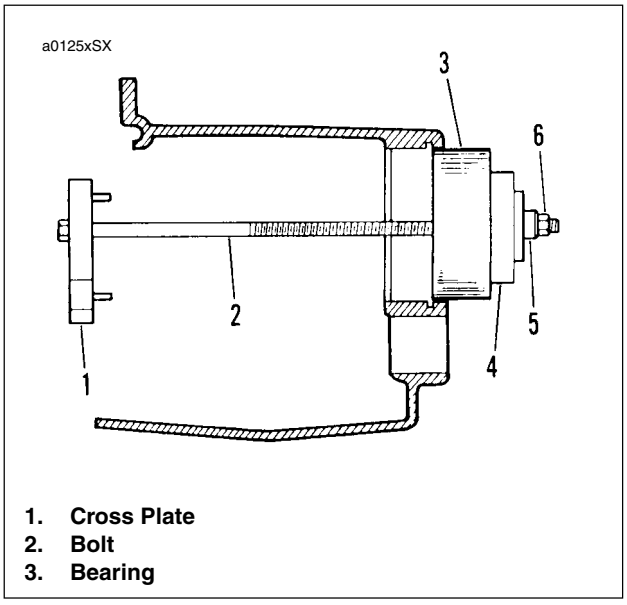


Figure 6-50. Cross Plate Mounting

INSTALLATION

Mainshaft 5th Gear Ball Bearing

1. Locate MAIN DRIVE GEAR REMOVER AND INSTALLER (Part No. HD-35316-A). See Figure 6-50. Place crossplate pins in appropriate holes in transmission case.
2. See Figure 6-51. Insert bolt (2) through crossplate (1), **new** bearing (3), driver (4) and thrust bearing (5). Thread nut (6) on end of bolt. Tighten nut carefully until bearing is started in bore squarely. Tighten nut (6) until bearing is seated against shoulder in bore.
3. At outside of case install beveled retaining ring in groove inside bearing bore with beveled side facing outside of case.
4. Lubricate bearing with SPORT-TRANS FLUID.



1. **Cross Plate**
2. **Bolt**
3. **Bearing**

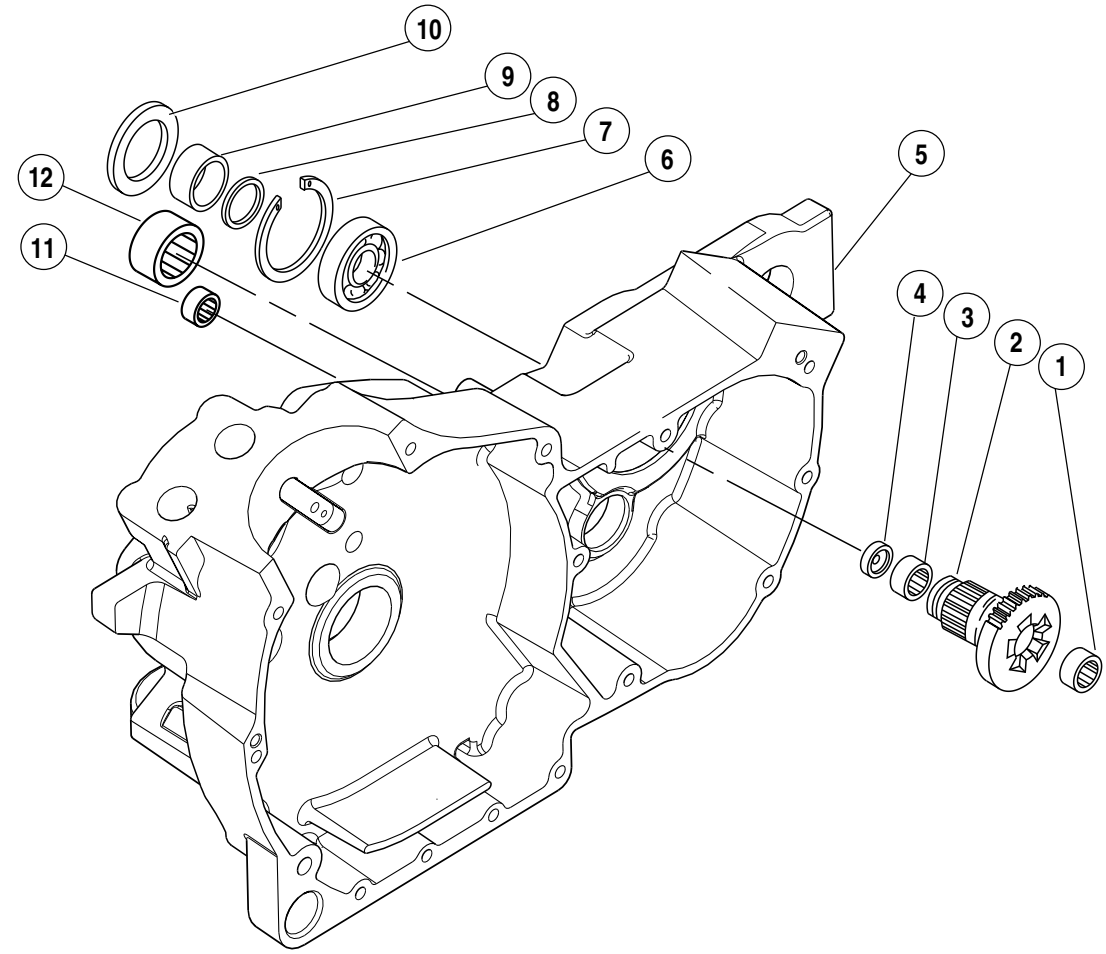
Figure 6-51. Installing Mainshaft Ball Bearing

Countershaft Needle Bearing

1. Find a suitable bearing driver 1-1/4 in. (31.75 mm) in diameter.
2. From the outside of the case place the needle bearing open end first next to the bearing bore. Hold the driver squarely against the closed end of the bearing and tap the bearing into place. The bearing is properly positioned when it is driven inward flush or 0.030 in. (0.762 mm) below the outside surface of the case.
3. Lubricate bearing with SPORT-TRANS FLUID.

Shift Drum Needle Bearing

1. Find a suitable bearing driver 0.8125 in. (20.64 mm) in diameter.
2. From the outside of the case place the needle bearing, open end first, next to the bearing bore. Hold the driver squarely against the closed end of the bearing and tap the bearing into place. The bearing is properly positioned when driven inward flush or 0.030 in. (0.762 mm) below the outside surface.
3. Lubricate bearing with SPORT-TRANS FLUID.



1. Bearing (2)
2. Fifth Gear Mainshaft
3. Needle Bearing (2)
4. Oil Seal
5. Right Crankcase Half
6. Ball Bearing
7. Retaining Ring
8. Quad Seal
9. Spacer
10. Oil Seal
11. Bearing (closed end) Shifter Drum
12. Bearing (closed end) Countershaft

Figure 6-52. Transmission Assembly Right Crankcase Half

LEFT CRANKCASE BEARINGS 6.13

NOTE

See Figure 6-55. Refer to Transmission assembly left crankcase half, for location of items discussed on this page.

REMOVAL

Mainshaft and Countershaft Bearings

1. See 6.8 TRANSMISSION CASE. Split crankcases in half.
2. See SHIFTER FORKS AND DRUM DISASSEMBLY under 6.9 TRANSMISSION DISASSEMBLY. Remove shifter forks and drum.
3. See 6.9 TRANSMISSION DISASSEMBLY. Remove countershaft and mainshaft.
4. Inspect the mainshaft and countershaft ball bearings for pitting, scoring, discoloration or other damage.
5. See Figure 6-53. If bearing replacement is required, remove retaining rings (1, 2). Press out bearings (3, 4) from the inside of the crankcase.

Shift Drum Bushing

1. Inspect the shifter drum bushing for pitting, scoring, discoloration or excessive wear. If bushing requires replacement press bushing out of crankcase from either side.

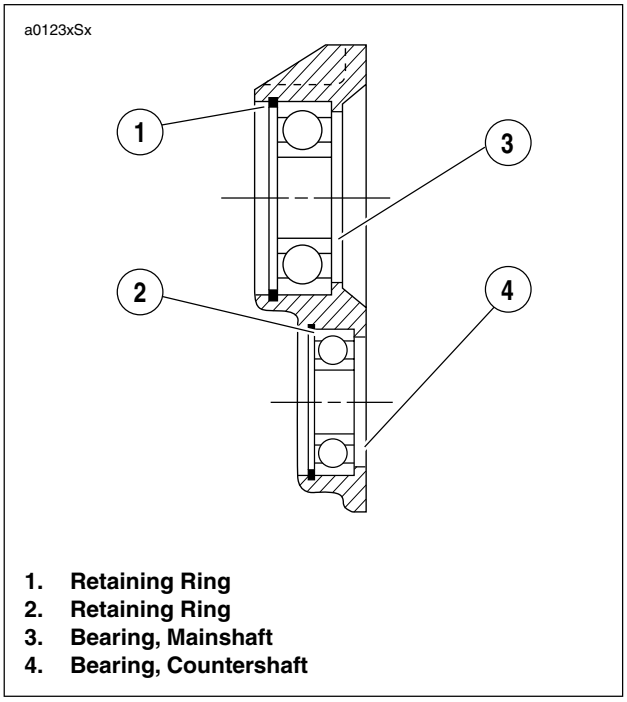
INSTALLATION

Mainshaft and Countershaft Bearings

1. Place crankcase on press with inside surface of crankcase downward.
2. Lay bearing squarely over bore with printed side of bearing upward. Place section of pipe or tubing (slightly smaller than outside diameter of bearing) against outer race. Press bearing into bore until bearing bottoms against shoulder.
3. Install **new** retaining ring with beveled side facing away from bearing.

Shift Drum Bushing

1. Place crankcase on press with outside surface of crankcase downward.
2. See Figure 6-54. Lay bushing squarely over bore. Locate socket or pipe that is slightly larger than diameter of bushing. Place socket or pipe on bushing and press into bore until bushing is flush with or 0.020 in. (0.508 mm) below inside surface. If using a pressing tool larger than diameter of bushing, the pressing tool will bottom against crankcase when bushing is flush with top surface.



1. Retaining Ring
2. Retaining Ring
3. Bearing, Mainshaft
4. Bearing, Countershaft

Figure 6-53. Ball Bearing Assembly

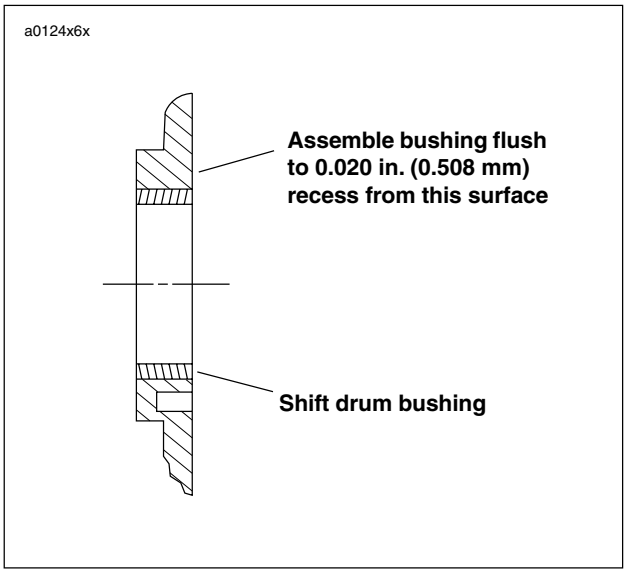
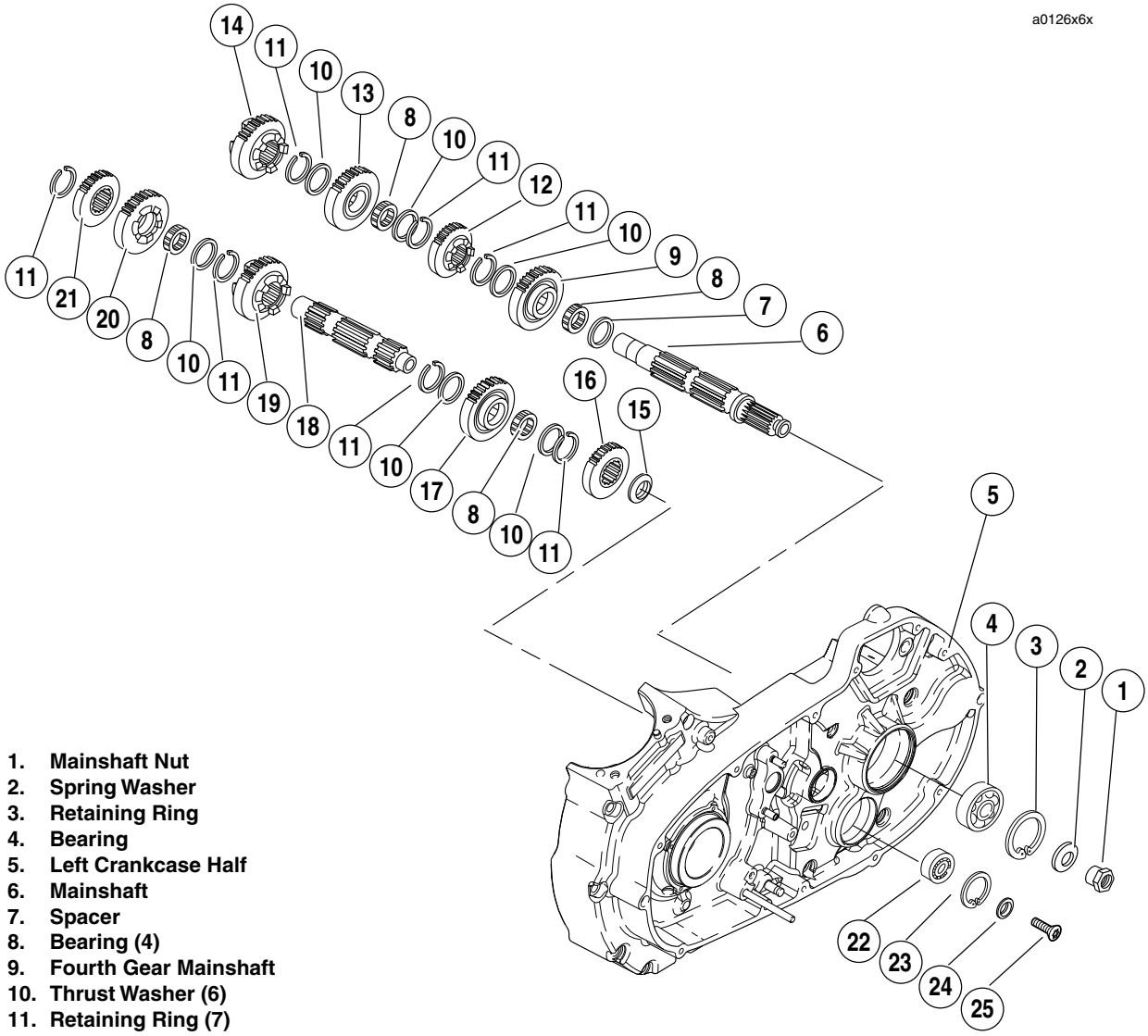


Figure 6-54. Shift Drum Bushing Assembly



1. Mainshaft Nut
2. Spring Washer
3. Retaining Ring
4. Bearing
5. Left Crankcase Half
6. Mainshaft
7. Spacer
8. Bearing (4)
9. Fourth Gear Mainshaft
10. Thrust Washer (6)
11. Retaining Ring (7)
12. First Gear Mainshaft
13. Third Gear Mainshaft
14. Second Gear Mainshaft
15. Spacer
16. Fourth Gear Countershaft
17. First Gear Countershaft
18. Countershaft
19. Third Gear Countershaft
20. Second Gear Countershaft
21. Fifth Gear Countershaft
22. Bearing
23. Retaining Ring
24. Countershaft Retainer
25. Screw

Figure 6-55. Transmission Assembly Left Crankcase Half

INSTALLATION

NOTES

- *If only transmission components were serviced, the flywheel assembly should already be in place.*
- *If flywheels and crankcases were serviced, install the flywheel assembly before re-installing the transmission assembly.*

Verify that all parts have been properly installed, as described earlier in this section under:

- 6.11 MAIN DRIVE GEAR
- 6.10 TRANSMISSION ASSEMBLY
- 6.13 LEFT CRANKCASE BEARINGS
- 6.12 RIGHT TRANSMISSION CASE BEARINGS

1. Remove left crankcase half from engine stand.
2. See Figure 6-56. Place transmission assembly onto TRANSMISSION REMOVER/INSTALLER FIXTURE (Part no. B-43985-2) on arbor press.
   a. Install Countershaft GUIDE (Part No. B-43985-4).
   b. See Figure 6-57. Install TRANSMISSION INSTALLER (Part no. B-43985-3) into crankcase.
3. See Figure 6-57. Press crankcase into transmission assembly until it bottoms out.
4. Remove transmission assembly and left crankcase half from fixture.
5. See Figure 6-58. Assemble crankcase halves together.
   a. Apply a thin coat of DOW CORNING SILASTIC or 3-M 800 sealant to crankcase joint faces.
   b. See CRANKCASE HALVES. Attach crankcase halves in torquing sequence shown.
   c. Apply several drops of LOCTITE® thread locker 262 (red) to last few threads.
   d. Tighten 1/4-in. fasteners to 80-110 **in-lbs** (9.0-12.4 Nm)
   e. Tighten 5/16-in. fasteners to 15-19 ft-lbs (20-25 Nm).

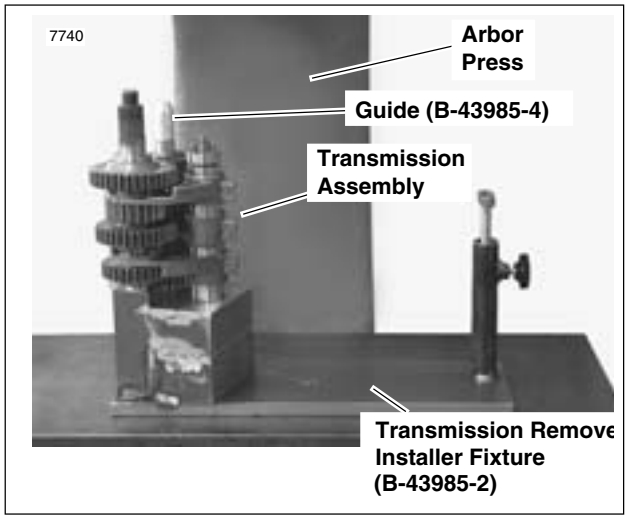


Figure 6-56. Transmission Assembly

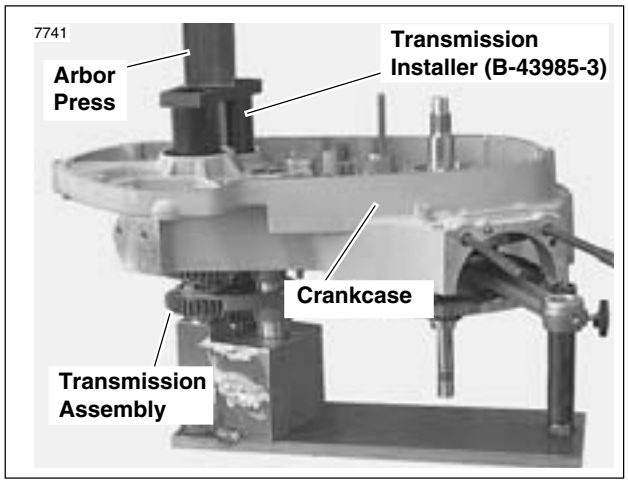


Figure 6-57. Transmission Remover/Installer on Fixture

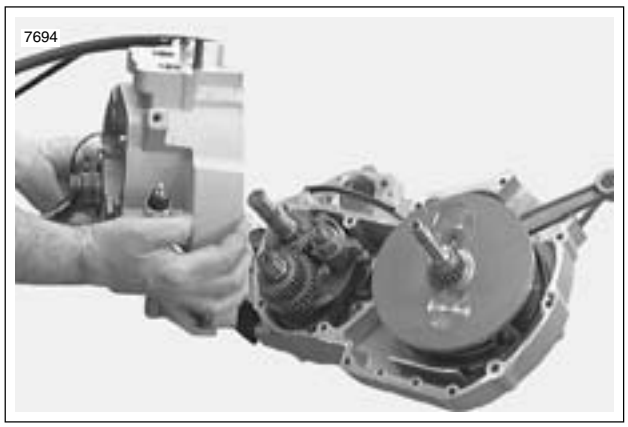
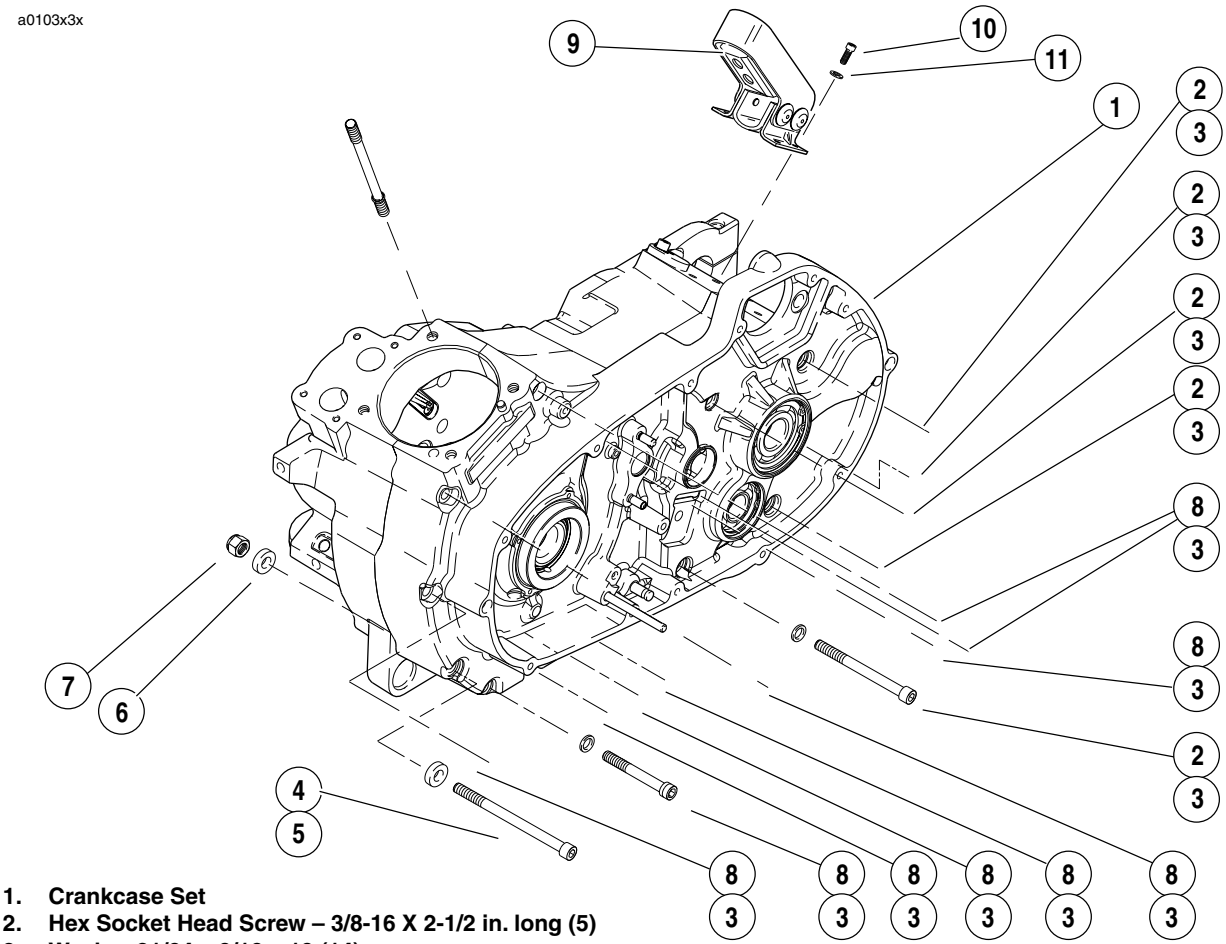


Figure 6-58. Crankcase Halves



1. **Crankcase Set**
2. **Hex Socket Head Screw – 3/8-16 X 2-1/2 in. long (5)**
3. **Washer 21/64 x 9/16 x 19 (14)**
4. **Hex Socket Head Screw – 3/8-16 X 4-1/2 in. long (1)**
5. **Spacer (1)**
6. **Washer - 3/8 I.D. X 13/16 O.D. (1)**
7. **Nyloc, Hex Locknut - 3/8-16**
8. **Bottom Case T40 TORX Bolt – 5/16-18 X 3-1/2 in. long (9)**
9. **Rear Isolator**
10. **Screw (4)**
11. **Washer (4)**

Figure 6-59. Crankcase Hardware

SHIFTER PAWL ADJUSTMENT 6.15

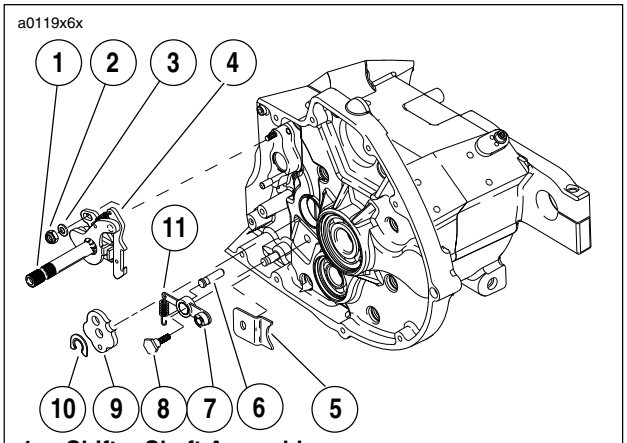
ADJUSTMENT

1. See Figure 6-60. Lift pawl over drum pins and place shifter shaft assembly on studs at transmission case. Loosely install a washer and locknut on each stud.
2. Install detent plate.
   a. Place detent plate over drum pins.
   b. Rotate plate until blind holes in plate align with pins in end of shifter fork drum.
   c. Install **new** retaining ring using SHIFT DRUM RETAINING RING INSTALLER (Part No. HD-39151).
3. Verify that retaining ring is fully engaged with drum groove.
4. Attach loop of spring over and into groove in post.
5. See Figure 6-61. Align shifter shaft.
   a. Place transmission in third gear.
   b. Place a No. 32 drill bit (0.116 in. dia.) through hole in detent plate (3), and between pawl (2) and drive pin at end of shifter drum shaft.
   c. Push down top of crank (4) to remove all clearance between pawl and drill bit; this will correctly align pawl to shift drum pins (do not push down with too great a force, as this might cause the shifter drum to rotate).
   d. With bit in place, tighten shifter shaft assembly bottom locknut (1) first to 90-110 **in-lbs** (10-12 Nm). Then, tighten shifter shaft assembly top locknut (1) to the same torque.
   e. **Remove drill bit**.
6. See Figure 6-52. Place **new** quad ring over threaded end of fifth gear, and position next to the gear taper. Install spacer over threaded end of fifth gear with chamfered end toward quad ring. Slide spacer up against bearing.
7. Install seal.
   a. Coat lips of seal with SPORT-TRANS FLUID.
   b. Position seal over spacer with lips of seal toward case.
   c. Use MAIN DRIVE GEAR SEAL INSTALLER (Part No. HD-41496) to gently tap seal into bore of case until the outside of seal is flush with outer edge of bore.

NOTE

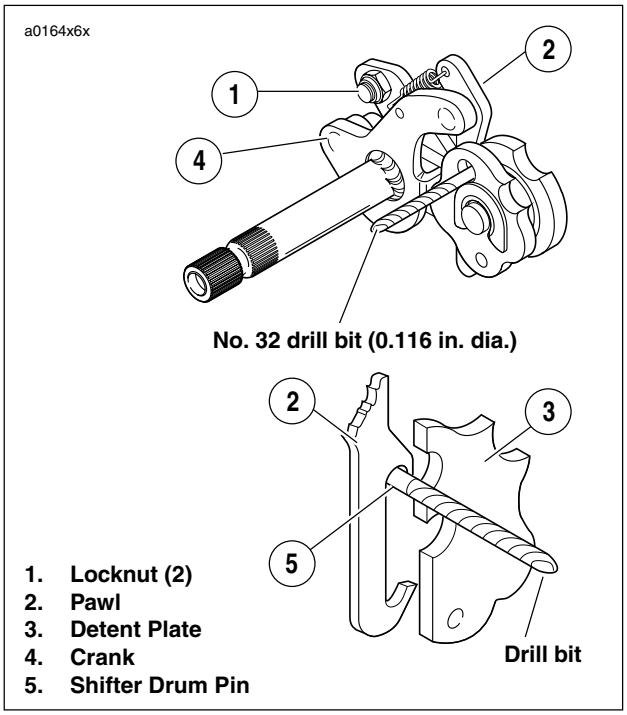
It is acceptable to recess seal to about 0.030 in. (0.762 mm) below outer edge of bore. Seal will be controlled by tool.

8. See Figure 6-62. Position retention collar next to end of counter shaft with beveled side facing outward.
   a. Apply several drops of LOCTITE® thread locker 243 (blue) to last few threads.
   b. Insert screw (1) through retention collar (2) and thread into end of shaft.
   c. Place transmission in gear, and tighten TORX screw (1) to 13-17 ft-lbs (18-23 Nm) torque.



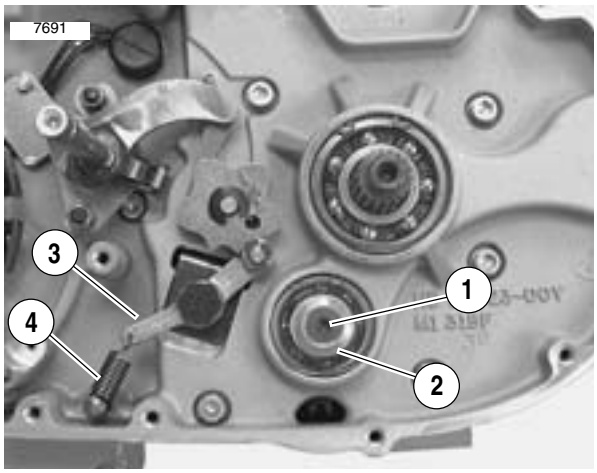
1. **Shifter Shaft Assembly**
2. **Locknut (2)**
3. **Washer (2)**
4. **Shifter Pawl**
5. **Plate**
6. **Pin**
7. **Detent Arm**
8. **Detent Screw**
9. **Detent Plate**
10. **Retaining Ring**
11. **Spring**

Figure 6-60. Installing Shifter



1. **Locknut (2)**
2. **Pawl**
3. **Detent Plate**
4. **Crank**
5. **Shifter Drum Pin**

Figure 6-61. Shifter Shaft Assembly Alignment



1. TORX Screw
2. Retention Collar
3. Detent Roller Arm
4. Spring

Figure 6-62. Countershaft Retainer

TRANSMISSION SPROCKET 6.16

REMOVAL

1. See Figure 6-63. Place transmission in first gear. Remove two socket head screws (5) and lockplate (4).

NOTE:

Transmission sprocket nut has left-hand threads. Turn nut clockwise to loosen and remove from main drive gear shaft.

2. See Figure 6-63. Remove transmission sprocket nut (3) from main drive gear shaft (1).
   a. See Figure 6-64. Secure pulley using SPROCKET LOCKING TOOL (1) (Part No. B-43982).

INSTALLATION

1. See Figure 6-63. Install transmission sprocket (2) with secondary drive belt onto main drive gear shaft (1).
2. Place transmission in neutral.
3. Apply a few drops of LOCTITE® thread locker 262 (red) to the **left-hand threads** of transmission sprocket nut (3). Position nut with washer-faced side facing transmission sprocket. Turn the nut **counterclockwise** to install it onto main drive gear shaft.
   a. See Figure 6-64. Install SPROCKET HOLDING TOOL (1) (Part No. B-43982) as shown.
   b. See Figure 6-65. Use MAINSHAFT LOCKNUT WRENCH (Part No. HD-94660-37B) and a torque wrench to tighten sprocket nut to 50 ft-lbs (68 Nm) INITIAL torque, ONLY.
   c. See Figure 6-66. Scribe a line on the transmission sprocket nut and continue the line on the transmission sprocket as shown.
   d. Tighten the transmission sprocket nut an additional 30°-40°.
   e. See Figure 6-63. Install lockplate over nut so that two of lockplate's four drilled holes (diagonally opposite) align with sprocket's two tapped holes.

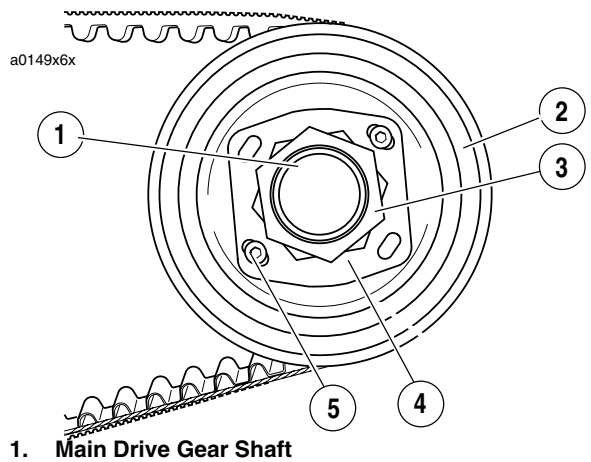
NOTE

The lockplate has four screw holes and can be turned to either side, so you should be able to find a position without having to additionally tighten the nut. If you cannot align the screw holes properly, the nut may be additionally TIGHTENED until the screw holes line up, but do not exceed 45° as specified above. Never LOOSEN nut to align the screw holes.

   f. See Figure 6-66. If lockplate will not align with holes, tighten nut to 45° maximum.

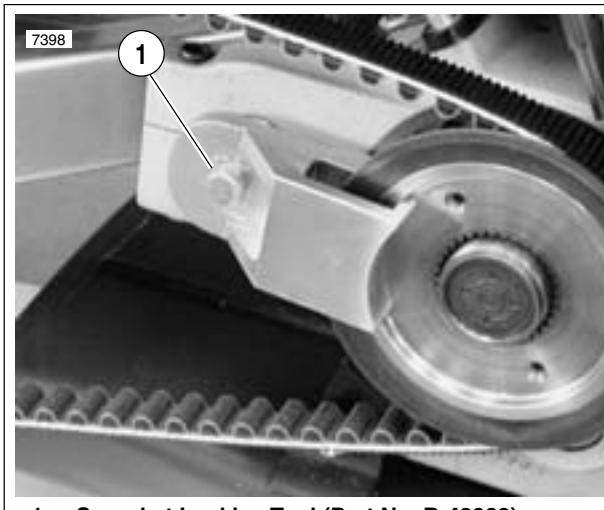
CAUTION

Maximum allowable tightening of sprocket nut is 45° of counterclockwise rotation, after initially tightening to 50 ft-lbs. Do not loosen sprocket nut while attempting to align the screw holes. If you cannot align lockplate and sprocket screw holes, nut may be additionally tightened 45° as specified above. Tightening too much or too little may cause the nut to come loose during vehicle operation.



1. **Main Drive Gear Shaft**
2. **Transmission Sprocket**
3. **Transmission Sprocket Nut (left-hand threads)**
4. **Lockplate**
5. **Socket Head Screw (2)**

Figure 6-63. Transmission Sprocket



1. **Sprocket Locking Tool (Part No. B-43982).**

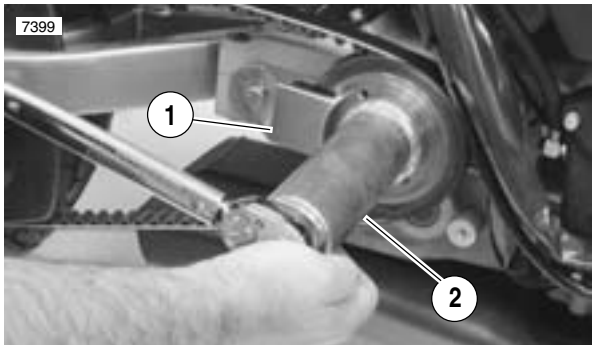
Figure 6-64. Sprocket Locking Tool

4. If you cannot align lockplate and sprocket screw holes, nut may be additionally tightened until screw holes align.
5. See Figure 6-63. Install two socket head screws through aligned holes of lockplate and into tapped holes of sprocket. Tighten to 90-110 **in-lbs** (10-12 Nm).

NOTE

*The original equipment socket head screws (5) have thread-locking compound applied to them. Since this compound remains effective for about three removal/installation cycles, the original screws may be reused up to three times. After the third removal/installation cycle, replace both screws with **new** screws identical to the original.*

6. Install the remaining removed components in the reverse order of the removal procedures. See the procedures listed in the respective component sections.
7. Fill transmission to proper level with fresh lubricant. See 6.4 CLUTCH.



1. Sprocket Holding Tool (Part No. B-43982)
2. Mainshaft Locknut Wrench (Part No. HD-94660-37B)

Figure 6-65. Transmission Sprocket Tightening

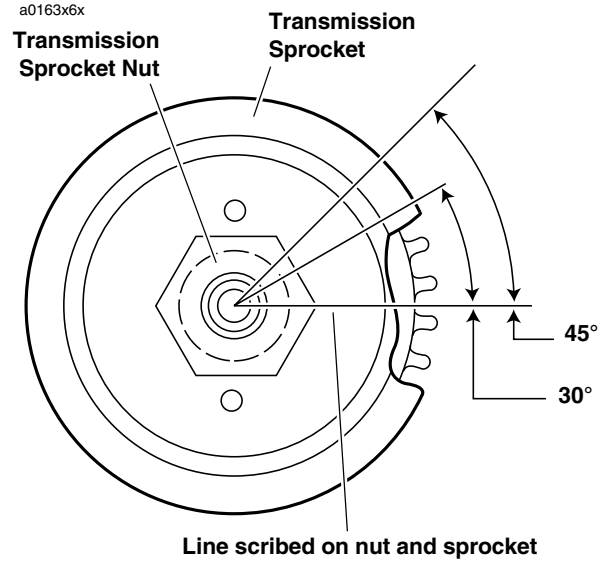


Figure 6-66. Aligning Transmission Sprocket